Policy, Planning, and Research

WORKING PAPERS

Public Economics

Country Economics Department
The World Bank
August 1989
WPS 238

The Distributional Consequences of a Tax Reform On a VAT for Pakistan

Ehtisham Ahmad
and
Stephen Ludlow

Policy tools, especially tax instruments, can be designed to increase revenues and at the same time protect the poor. The authors' method of estimating the consequences of tax reform shows, for example, that a value-added tax would make Pakistan's tax system more buoyant and reduce the production distortions inherent in Pakistan's current tax system—and not at the expense of the poor.

Policy, Planning, and Research

WORKING PAPERS

Public Economics

To what extent do rich or poor lose or gain from different tax reform packages? Using estimates of directions of reform from Ahmad and Nicholas Stern (1988), Ahmad and Ludlow compare the consequences of different options by analyzing actual patterns of consumption and production.

They illustrate, for policymakers, how directions of reform might be evaluated without overly complicated models of the economy, using the sort of data now increasingly available — for example, household surveys being conducted by various World Bank divisions, and by statistical offices around the world.

A country such as Pakistan, which relies on a narrow tax base — consisting primarily of tariffs on intermediate goods and excises on domestic manufacturing—has difficulty ensuring that the tax system keeps pace with the growth in national income and activity, without frequent discretionary changes.

Such changes increase the distortions caused by cascading, with adverse effects on both exports and poor households.

Country-specific administrative capabilities must be considered in designing alternative tax systems, but generally the VAT will be preferable to a system of ad valorem retail sales taxation. The retail sales tax also avoids cascading but yields more uncertain revenues than the VAT, which is collected at each stage in the production process, not just at the retail level. Indeed, one option is to adopt a VAT at the import and manufacturing stages and at the wholesale level.

A VAT also provides a better flow of information—useful in the collection of income and corporate taxes, and in reducing distortions in production decision-making. A correctly designed consumption-based tax instrument such as the value-added tax (VAT) can increase the tax base and remove production distortions — at the same time protecting the interests of the poor.

This paper is a product of the Public Economics Division, Country Economics Department. Copies are available free from the World Bank, 1818 H Street NW, Washington DC 20433. Please contact Ann Bhalla, room N10-061, extension 60359.

The Distributional Consequences of a Tax Reform On a VAT for Pakistan

by
Ehtisham Ahmad
and
Stephen Ludlow

Table of Contents

Ehtisham Ahmad is Director of the Development Economics Research Programme at the London School of Economics (LSE), currently on leave at the Public Economics Division of the World Bank, and Stephen Ludlow is Research Officer at the LSE. We are grateful to Bela Balassa, Richard Bird, Milka Casanegra-Jantscher, Shahid Chaudhry, Javad Khalilzadeh-Shirazi, Johannes Linn, Sandy Mackenzie, Pradeep Mitra, Akbar Noman, Tony Pellechio, Asghar Qadir and to participants at seminars at Toronto and Yale for helpful comments.

1. Introduction

Developing countries in the process of growth and structural adjustment face requirements for additional tax revenues. There is, moreover, a concern with protecting the poor against a deterioration in their living standards, which makes it imperative to examine the distributional consequences of policy options. In this paper we examine a method of selecting appropriate rate structures, with guidance from the recent literature on tax reform, and of making these operational, with the effects on different types of households being spelt out in some detail.

A first step in the analysis of reform is to describe existing taxes, and the relationship between the tax system and prices of final goods. One then examines the consequences of tax changes (and thus price changes) on households, resulting government revenues, and also implications for production. For indirect taxes, this yields a ranking of commodities that are more or less attractive candidates for additional taxation. Note that this method involves neither the estimation of "optimal taxes" nor the use of a computable general equilibrium model. For the most part the analysis of the directions of reform utilizes actual patterns of consumption and production. In this paper we use computations of directions of reform for Pakistan based on Ahmad and Stern (1988) to guide the choice of alternative tax reform packages. The distributional consequences of these alternatives are examined further in terms of gainers and losers on the basis of detailed information from household data sets from Pakistan. This provides a method for translating the analysis of reform into operationally useful options.

With a narrow indirect-tax base, Pakistan has come to rely increasingly on revenue from customs duties combined with excises on domestic production to meet continuing demands for additional resources. A consequence of this tax structure is a dependence on high rates of tax or duty on a limited set of commodities [see the Report of the National Taxation Reforms Commission (NTRC), 1987, for a detailed discussion of the issues]. This limitation of the availability of tax instruments is not uncommon in developing countries, and in the Pakistan case reflects a structure of taxation essentially inherited from pre-independence days. Despite frequent rate changes the tax structure has scarcely evolved, particularly in terms of coverage and newer instruments. Tax collections as a proportion of GDP have oscillated around 14% during the 1980's and non-tax revenues were in the order of 2% of GDP, on average, during this period. While revenues (including both tax and non-tax revenues) were generally sufficient to meet current expenditures until 1983 or so, and there was usually a contribution towards the developmental budget, a systematic deficit of current expenditures over revenues has opened up in recent years.

It has been argued that commodities such as wheat, pulses, tea and sugar are poor candidates for additional taxation if distributional considerations are important. The analysis of reform involves evaluation of additional revenue generation in terms of effects on distribution, as well as on production and incentives (see e.g. Ahmad and Stern 1984 and 1987 for applications to India, and 1987a and 1988 for directions of reform for Pakistan). While the classification of goods to be taxed at a higher rate may be difficult in some instances (see e.g., Bird, 1987), and obvious candidates such as cosmetics and tobacco products may be also consumed by

the poor, a more detailed examination of the distributional characteristics of these goods is often quite useful, since this dominates the potential directions of reform. For instance, in Pakistan, the tobacco products consumed by the poor are mainly bidis, which bear little tax, and which are different from processed cigarettes (that are highly taxed). A value added tax (VAT), supplemented with selective excises, could achieve considerable differentiation, with particular final goods such as cigarettes (which also raise much of the existing excise revenue) being taxed heavily on distributional, revenue and paternalistic grounds (if smoking is considered harmful for health). If the paternalistic approach dominates, it may be necessary to tax all tobacco, although the evidence against bidis may not be as damning as against cigarettes! In the final analysis, what is important is the structure of the overall indirect tax system, and in the case described, would include a joint evaluation of the VAT and system of excises, in terms of price changes and effects on households.

A VAT is seen as an instrument which could lead to an expansion of the base of taxation for a country like Pakistan, and this has been adopted in an increasing number of developing countries (see for instance Tanzi, 1987). This has the attractive property in that taxes paid on inputs are credited against the tax liability on outputs, thus avoiding the distortions arising from the cascading inherent in the present system. The two major considerations with a VAT are (i) administration, and (ii) design of rate structure. On (i) there are the issues of implementation capability, and speed of introduction. Despite its administrative expertise, the Indian Government was forced to restrict the introduction of the VAT to a replacement of the central excise duties (or MANVAT), since under the Constitution sales taxes come under the jurisdiction of State

Governments. However, we do not go into the issue of jurisdictions, administrative authorities, and so on in any detail here. With respect to (ii) we ask whether there are conditions under which a single, uniform rate structure might be desirable, and relatedly, what an "appropriate" rate structure for the VAT should be, given the possibility of differentiation through the use of excises.

The design of rate structure interacts with administrative considerations and on these grounds uniformity of indirect taxation is often recommended. Deaton (1981) [see also Deaton and Stern (1987), and the discussion in Newbery and Stern, Chapter 2] discusses conditions under which uniform taxation might be desirable and these entail, inter alia, the provision of optimal lump-sum transfers, additive separability, and identical Engel curves. In practice, however, in the absence of optimal lump-sum transfers, a uniform structure of indirect taxation is usually regressive (see Ahmad and Stern, 1987). In this paper we experiment with various alternative rate structures including exemptions for broad classes of goods, and a treatment of both proportional and differentiated VAT rates.

While the illustrations in this paper are based on reforms which involve the introduction of a VAT the method is general and could be applied to any tax change resulting in price changes. Thus the tax reform options chosen in this paper, which are a combination of selective excises and the VAT, could have been achieved, for instance, by a retail sales tax. The choice between a VAT and a retail sales tax would be governed by administrative considerations. While the VAT could be introduced in stages, at the manufacturing and wholesale levels without danger of revenue

loss in the first instance, there may not be adequate administrative capability for making a retail sales tax workable. Further advantages of the VAT include self policing incentives, as well as information flows which could improve income tax collections (Gil-Diaz, 1987).

An illustration of the theory of reform and its operational counterparts are described in Section 2. Section 3 contains the empirical investigations, and concluding remarks are in Section 4.

2. The Directions of Reform

In this section we draw on the directions of reform based on Ahmad and Stern (1988), to guide the choice of tax-reform vector combinations to be evaluated further in terms of potential gainers and losers.

For marginal changes at the status quo, the possibility of welfare-improving reforms may be seen in terms of the social costs of raising a unit of government revenue. The marginal social cost associated with any particular indirect tax is given by the welfare-weighted impact on households of a change in the tax. The size of the increase is given by the amount required to raise an extra unit of revenue. For relatively undistorted economies, or where shadow prices are proportional to producer prices, the effects on revenue are given by actual demands and the response of consumers to the tax change. However, in most developing countries, market imperfections and government policy lead to incentives inherent in relative market prices facing producers to diverge substantially from relative social opportunity costs. The theory of reform can be generalized to incorporate the divergence between shadow prices and market prices (see

Dreze and Stern, 1987, for theoretical derivations, and Ahmad and Stern, 1988, for examples for Pakistan).

The effects of tax changes on households, or the change in welfare V, may be given by the expression:

$$\partial V/\partial t_i = - \Sigma_h \beta^h (x_i)^h, \qquad \ldots. (1)$$

where $(x_i)^h$ is the demand for commodity i by household h, and the β^h are welfare weights or value judgements, which may be exogenously determined. We have defined these welfare weights in terms of a transfer of Rs.1 to household h with income I^h relative to the poorest household, with income I^i, as $(I^i/I^h)^e$, where e is an inequality aversion parameter. For e=0, transfers to all households are equally valuable, but for e > 0 transfers to poorer households are considered more valuable than to richer ones. For example if I^h had twice the income of I^i, then e = 1 would imply that Rs.1 to the poorest would be worth twice that to household h, whereas e = 5 indicates that a transfer to the poorest would be worth 32 times that to household h.

The amount a given tax would have to be raised to yield one unit of government revenue, in the undistorted case, is given by ΔR, or

$$\partial R/\partial t_i = X_i + \Sigma_j t_j(\partial x_j/\partial t_i), \qquad \ldots. (2)$$

where X_i is the aggregate consumption of commodity i, and $(\partial x_j/\partial t_i)$ is a matrix of uncompensated aggregate demand derivatives. The marginal social cost of raising a particular tax, defined as λ_i [see Ahmad and Stern

(1984), (1987) and (1988)] is given by $\Delta V/\Delta R$, and one would shift taxation from goods with high λ_i to those with lower λ_j. Note that λ_i may be written as a combination of the distributional characteristic, D_i, and a tax elasticity,

$$\lambda_i = D_i \Big/ \left[\frac{t_i}{t_i X_i} \quad \frac{\partial}{\partial t_i} \quad (t.X) \right], \qquad \ldots\ (3)$$

where D_i may be defined as

$$D_i = \Sigma_h \beta^h (x_i)^h / X_i. \qquad \ldots\ (4)$$

Where inequality aversion is zero, and $\beta^h = 1$ (V h), clearly Di = 1 (V i). However, for positive inequality aversion, e > 0, a rank order for the distributional characteristic appears, and the rankings of the D_i are fairly stable (see Tables 1a and 1b). Thus "gur", "wheat" and "edible oils" rank consistently high in terms of their distributional characteristic, and "cigarettes", "beverages", and "recreation and transport" relatively low.

In the case of the distorted economy, equation (2) no longer holds, and we need in addition to the l.h.s., a term describing the effects of the divergence between market prices and shadow prices, $\Sigma_j (p_j - v_j) \partial x_j / \partial t_i$ [for further details see Dreze and Stern, (1987), or Ahmad and Stern (1986, 1988)].

In Table 2, from Ahmad and Stern (1988), we present the rankings for the marginal cost of raising government revenue from the i^{th} good. The two sets of rankings for λ^{ν} present directions of reform when the divergence between market prices and shadow prices is taken into account.

The shadow prices used reflect a sensitivity to alternative valuations of wage and asset conversion factors, incorporating different assumptions about distortions in the Pakistan labour and capital markets (see Ahmad, Coady and Stern, 1988, for further details). On the other hand the λ_i presents the directions of reform for the, hypothetical, undistorted case. Note that, for higher values of e, the inequality aversion parameter, the three sets of reform directions converge, as the distributional characteristic of the commodities begins to dominate the results. It is apparent that commodities with a high ranking distributional characteristic, e.g. wheat, are poor candidates for increased taxation, provided one's inequality aversion is positive. For e = 0, or zero inequality aversion, one would wish to tax commodities in inelastic demand. Under this criterion, commodities such as wheat would be fair game for additional taxation.

The analysis of reform suggests that, in general, one would not wish to introduce uniform proportional taxation. Even with zero aversion to inequality, there is no clear presumption that this would be desirable, since the effects on the production structure are still important and the directions of the reform are particularly sensitive to the specification of shadow prices. With e = 0 in the undistorted case [see rankings for λ_i in Table 2], one would suggest raising the tax on wheat relative to rice, or in the direction of equality of tax rates, this result is reversed when tax changes in the distorted economy are considered [see the rankings for λ^v (e=0) in Table 2].

The analysis of the effects of a tax reform specifically requires calculations of 'effective taxes' on each commodity [see e.g. Ahmad and

Stern (1986) for details]. The 'effective tax', t^e, is the tax element in the price of the final good, including the taxation of inputs, inputs to those inputs and so on, and may be written as (see Ahmad and Stern, 1986, for details),

$$t^e = t^d(I - A^d)^{-1} + t^m A^m (I - A^d)^{-1}, \quad \ldots. (5)$$

where t^d is the vector of domestic taxes (excises and sales taxes on domestic production), and $(I - A^d)^{-1}$ is the Leontief inverse matrix. The term $t^m A^m$ reflects the taxation of imported inputs A^m used in the production of domestic goods. If p^o is the existing price vector, then we may define the basic price (see Stone, 1970), p^b as

$$p^b = (p^o - t^e). \quad \ldots. (6)$$

The basic price may be taken as representative of the real resource costs in the economy, which are assumed to be unchanged by the reform. Replacing the effective tax vector with a new set of taxes, t^v, results in a new price level, p^1,

$$p^1 = p^b + t^v, \quad \ldots. (7)$$

and the change in price is

$$\delta p = p^1 - p^o = t^v - t^e. \quad \ldots. (8)$$

The change in prices determines the distributional consequences of the reform. In addition to the "effective taxes", we require information

on consumption patterns of households. In this paper we have used the Household Income and Expenditure Survey (HIES) for 1984/5. In the empirical 'experiments', we contrast the money loss or gain to each household in terms of a proposed reform. The money gain/loss to households would be a function of the price change and pattern of consumption and a first round approximation (assuming quantities consumed constant, before and after the reform) is

$$L = -\sum_{i=1}^{21} x_i^h \, \delta p_i, \qquad \ldots\ldots (9)$$

We have 16,575 households in our sample, and for the analysis we use a 21-commodity aggregation to match with tax categories. For small tax changes, L is a money measure of the reform to household h. This may be expressed, using the equivalent variation E^h, as the utility change for household h, $V^{h1} - V^{h0}$, where V^h is the indirect utility function for household h at time 0 or 1. The equivalent variation is defined using the implicit function:

$$V^{h1} = V^h (p^0, M^h + E^h), \qquad \ldots\ldots (10)$$

where M^h is the income of household h at time 0. E^h is the money that would be given to household h, at pre-reform prices, to reach post-reform utility levels, and may be written explicitly using the expenditure function $e^h(\,)$

$$E^h = e^h (p^0, V^{h1}) - M^h. \qquad \ldots\ldots (11)$$

While it is clear that one cannot expect quantities consumed to remain constant subsequent to a major reform, if only because this would imply a violation of the budget constraint for a number of households, L is still of value in that it describes possible first round effects, and is more robust in that it uses actual consumption data without resorting to the use of fitted values implicit in the analysis based on equivalent variations.

Note that while the introduction of a VAT is a major reform in the administrative sense, it would not be considered a reform in terms of the effects on households if $p^1 = p^0$, and the vector of effective taxes remained unchanged. The reforms we discuss reflect either marginal or major changes in effective taxes and in general $\delta p \neq 0$. However a VAT introduction might qualify as a marginal reform if δp is small. On the other hand a revenue-neutral reform could be considered major if δp is large.

The data requirements for the evaluation of a major reform are quite stringent (see for instance the discussions in Newbery and Stern, 1987, particularly the chapters by Deaton and by Ahmad and Stern). Major price changes would require the specification of utility and demand functions for each household, rather than the use of aggregate demand responses and actual consumptions as in the marginal reform case.

In the evaluation of major reforms, we estimate demand parameters for quintiles in both rural and urban areas for Pakistan using an extended Linear Expenditure System (ELES), with the 1984/5 HIES [see Ahmad and Ludlow, (1987) for a description of the method]. The equivalent variation

Table 1a Distributional Characteristics

	e=0	e=0.5	e=1.0	e=2.0	e=5.0
Wheat	1	0.5649	0.3549	0.1772	0.0645
Rice	1	0.5159	0.2991	0.1301	0.0359
Pulses	1	0.5271	0.3131	0.1442	0.0470
Maize	1	0.5151	0.2959	0.1244	0.0305
Meat	1	0.4424	0.2283	0.0853	0.0193
Milk	1	0.4967	0.2799	0.1176	0.0316
Veg/Fruit/Spices	1	0.4895	0.2755	0.1178	0.0341
Edoils	1	0.5261	0.3135	0.1458	0.0485
Sugar	1	0.5036	0.2866	0.1216	0.0328
Gur	1	0.5951	0.3863	0.1994	0.0744
Confectionary	1	0.4049	0.1936	0.0649	0.0130
Tea	1	0.4963	0.2811	0.1199	0.0338
Beverages	1	0.3451	0.1406	0.0349	0.0030
Cigarettes	1	0.4522	0.2375	0.0904	0.0205
Bidis	1	0.5050	0.2890	0.1248	0.0363
Housing	1	0.4459	0.2359	0.0948	0.0264
Clothing	1	0.4883	0.2758	0.1194	0.0355
Hygiene & Medicines	1	0.4660	0.2538	0.1044	0.0288
Recreation & Transport	1	0.3665	0.1641	0.0524	0.0104
Other Food	1	0.3950	0.1892	0.0660	0.0138
Other Non-Food	1	0.3901	0.1851	0.0640	0.0139

Table 1b Ranking of Distributional Characteristics

	e=0	e=0.5	e=1.0	e=2.0	e=5.0
Wheat	1	2	2	2	2
Rice	2	5	5	5	6
Pulses	3	3	4	4	4
Maize	4	6	6	7	12
Meat	5	16	16	16	16
Milk	6	9	10	12	11
Veg/Fruit/Spices	7	11	12	11	8
Edoils	8	4	3	3	3
Sugar	9	8	8	8	10
Gur	10	1	1	1	1
Confectionary	11	17	17	18	19
Tea	12	10	9	9	9
Beverages	13	21	21	21	21
Cigarettes	14	14	14	15	15
Bidis	15	7	7	7	7
Housing	16	15	15	14	14
Clothing	17	12	11	10	7
Hygiene & Medicines	18	13	13	13	13
Recreation & Transport	19	20	20	20	20
Other Food	20	18	18	17	18
Other Non-Food	21	19	19	19	17

Note: The distributional characteristic (see equation 4) has been estimated using the 1984/5 Household Income and Expenditure Survey for Pakistan. e is an inequality aversion parameter, defined in the text.

Table 2 Directions of Reform in the Distorted Economy λ^{ν} and for effective taxes λ_i

	Ranks λ^{ν}					Ranks λ^{ν}					Ranks λ_i				
	WCF 0.9; ACF 0.75					WCF 0.75; ACF 0.5									
	e = 0	0.5	1.0	2.0	5.0	e = 0	0.5	1.0	2.0	5.0	e = 0	0.5	1.0	2.0	5.0
Wheat	8	2	1	1	1	9	3	1	1	1	10	4	1	1	1
Rice	13	12	12	10	9	12	12	12	12	9	7	7	6	6	7
Pulses	7	3	2	2	2	8	4	2	2	2	8	5	3	2	2
Meat/Egg	1	7	8	11	12	3	8	8	10	11	13	13	13	13	13
Milk	6	6	6	7	8	4	7	6	6	7	11	11	10	10	11
Veg. etc.	2	5	5	5	6	2	1	5	5	6	12	12	11	11	9
Edible Oils	11	11	11	8	7	11	11	11	11	8	1	1	4	4	4
Sugar	4	1	3	3	5	5	2	3	3	4	3	3	5	5	5
Tea	10	10	7	6	3	10	10	10	7	5	5	2	2	3	3
Housing	9	9	10	9	10	7	9	9	8	10	2	6	8	9	10
Clothing	12	13	13	13	11	13	13	13	13	13	6	8	9	8	8
Other Food	5	4	4	4	4	6	5	4	4	3	9	9	7	7	6
Other Non-Food	3	8	9	12	13	1	6	7	9	12	4	10	12	12	12

Source: Ahmad and Stern (1988)

Note: The direction of reform for the distorted economy is based on equation(2) modified to reflect the difference between market prices and shadow prices for varying combination of wage (WCF) and asset (ACF) conversion factors.

Table 3a Effective Taxes and Proposed Equal Revenue Reforms

Commodity	Effective Tax	Reforms					
		I	Ia	II	IIa	III	IIIa
	%	%	%	%	%	%	%
(1) Wheat	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(2) Rice	2.3	2.3	2.3	2.3	2.3	2.3	2.3
(3) Pulses	2.0	0.0	0.0	0.0	0.0	0.0	0.0
(4) Maize	0.7	0.0	0.0	0.0	0.0	0.0	0.0
(5) Meat	0.5	0.0	0.0	5.0	5.0	5.0	5.0
(6) Milk	0.5	0.0	0.0	0.0	0.0	5.0	5.0
(7) Vegetables/Fruit/Spices	0.7	0.0	0.0	0.0	0.0	0.0	0.0
(8) Edoils	13.9	14.1	10.8	13.5	10.3	13.1	9.9
(9) Sugar	28.7	14.1	10.8	13.5	10.3	13.1	9.9
(10) Gur	1.6	1.6	1.6	1.6	1.6	1.6	1.6
(11) Confectionary	18.5	14.1	16.7	13.5	16.1	13.1	15.5
(12) Tea	11.0	14.1	16.7	13.5	16.1	13.1	15.5
(13) Beverages	17.0	14.1	16.7	13.5	16.1	13.1	15.5
(14) Cigarettes	77.0	77.0	77.0	77.0	77.0	77.0	77.0
(15) Bidis	6.0	6.0	6.0	6.0	6.0	6.0	6.0
(16) Housing/Fuel/Light	10.0	14.1	10.8	13.5	10.3	13.1	9.9
(17) Clothing	9.0	14.1	16.7	13.5	16.1	13.1	15.5
(18) Hygiene/Medicine	25.0	14.1	10.8	13.5	10.3	13.1	9.9
(19) Recreation/Transport	9.0	14.1	16.7	13.5	16.1	13.1	15.5
(20) Other Food	3.0	3.0	3.0	5.0	5.0	5.0	5.0
(21) Other Non-Food	15.0	14.1	16.7	13.5	16.1	13.1	15.5
Gainers - Pakistan		60.87	62.76	61.86	62.95	54.59	61.57

Note I to IIIa are neutral revenue reforms (+ or - 0.2% due to rounding errors).

The effective taxes reflect the tax element in the price of the 21 commodity groups, and the proposed tax vectors are shown for Reforms I-IIIa. The last row indicates the proportion of households that gain from the reform.

Table 3b Distribution of Gainers for Equal Revenue Reform

Per Capita Expenditure Groups	Mean Rs/ Capita Per month	No. of House-holds	Percentage of Gainers in each Group Reforms					
			I	Ia	II	IIa	III	IIIa
1	98.7	828	57.00	59.18	64.98	64.25	71.01	71.86
2	126.5	829	61.52	64.29	69.72	69.72	71.29	74.67
3	143.4	829	59.83	64.05	66.47	67.31	64.78	70.69
4	155.9	829	66.95	67.31	71.53	70.45	67.31	73.34
5	168.1	828	64.01	68.72	70.65	71.01	66.30	73.31
6	181.4	829	68.15	71.17	72.74	72.98	64.90	72.26
7	193.7	829	66.83	70.57	70.69	72.14	61.52	71.65
8	205.7	829	66.22	71.17	70.69	73.94	59.35	70.81
9	221.0	828	71.26	72.83	72.22	73.91	60.39	72.34
10	232.0	829	68.88	73.46	69.36	74.31	57.66	69.96
11	249.8	829	62.97	67.67	65.14	67.19	54.89	65.50
12	264.3	829	64.54	70.81	64.66	68.15	53.68	64.41
13	283.0	828	62.80	68.96	61.96	68.72	49.40	60.63
14	309.3	829	62.00	65.38	61.16	65.02	49.22	60.43
15	335.0	829	62.12	64.29	61.52	64.90	49.10	58.38
16	368.5	829	61.28	63.69	55.97	61.40	45.84	54.89
17	416.8	828	57.73	60.27	54.35	56.04	41.67	49.88
18	490.9	829	53.08	52.23	46.32	46.68	39.20	43.31
19	624.6	829	45.72	38.96	39.57	34.26	35.83	34.26
20	1158.2	829	34.62	20.14	27.50	16.65	28.47	18.82
Total		16575	60.87	62.76	61.86	62.95	54.59	61.57
Pakistan Urban		7459	58.81	65.65	55.74	62.70	40.25	54.85
Pakistan Rural		9116	62.56	60.39	66.86	63.15	66.32	67.07

Note: Groups are sorted by per-capita expenditure, so group 1 is the per-capita expenditure of the poorest 5% while group 20 is the per-capita expenditure of the richest 5%.
I to IIIa are revenue neutral reforms (+ or - 0.2% due to rounding errors).
See Table 3a for a description of the Reforms.

is thus specified, using the Stone-Geary utility function which underlies the LES, for each expenditure group by the expression:

$$E^h = (M^h - p^1.\gamma) \prod_i \left[\frac{p_i^0}{p_i^1} \right]^{\alpha_i} - (M^h - p^0.\gamma), \quad \ldots\ (12)$$

where α_i (marginal budget shares), and γ (supernumerary consumption), are the estimated parameters from the LES. This provides a description of the method involved in the analysis of both major and marginal reforms and the associated data requirements. The analysis for Pakistan follows.

3. The Analysis

The analysis of the effects of a tax reform on households in different circumstances involves a description of the existing tax system, so that tax and price changes can be measured, and this entails an analysis of the consumption patterns of households. For the second requirement a household expenditure survey is needed, and, as stated earlier, we have used the HIES 1984/85. Since we have 16,575 households, for convenience of presentation the results are grouped in terms of half-deciles of households ranked by per capita expenditure, the analysis of gainers and losers is conducted for each individual household. Given that consumption out of home-grown stocks is an important feature especially in rural areas, the analysis of the effects of price changes is carried out in terms of actual purchases by households.

For the description of the existing tax system we draw on earlier work, specifically the calculations of 'effective taxes' at a disaggregated level of commodity classification (see Ahmad and Stern, 1986). The

analysis is based on an 87-sector economy-wide input-output table. This method incorporates problems such as evasion, the multiplicity of announced rates for various commodity groups and so on, in that the analysis is at the level of collections rather than announced rates. The 87-sector effective taxes were merged to 21-broad commodity groups to match categories that we were able to identify in the consumer expenditure data in the 1984/5 HIES. In the absence of an input-output table for 1984/5, and since the Ahmad-Stern effective taxes were for 1975/6, we updated these on the assumptions (a) that the Leontief inverse would not have greatly changed over the period to 1984/5; and (b) that administration and/or enforcement was similar in the two years, so that nominal rates (collections as a proportion of the base) could be adjusted by a factor proportional to the change in announced rates. The resulting effective taxes are shown in Table 3a. Note that the input-output information is in terms of purchaser prices.

For the equivalent variations we needed the parameters of the Stone-Geary utility function, and these have been estimated using the ELES method, on a stepwise basis for 5 per capita expenditure groups in urban areas and a similar number in rural areas of Pakistan.

3.1 Equal revenue reforms

In this section we examine the effects of alternative changes in the rate structure of indirect taxes, keeping revenues and quantities constant. Thus the reforms described in Table 3a assume that $t^eX' = t^vX' = R$, where R is the total revenue and X' is the vector of aggregate purchases in the pre-reform period (for consumption out of home grown purchases we

assume that taxation through purchased inputs, if agriculture is exempted, will be unchanged in the post-reform period). Six reforms are described in Table 3a. The existing effective tax vector is replaced by a combination of excises and a VAT, the rates of the latter being chosen after fixing the excises to yield equal revenues in reforms I, II and III. In Reforms Ia, IIa and IIIa, we specify, in addition a lower (fixed) rate of VAT on 'essential' items, allowing a higher rate on the remaining items to yield equal revenue.

We assume that "gur", "cigarettes", "bidis", and "other food" would continue to be taxed as before, with a combination of excises and taxation through inputs (if these sectors are treated as exempt from the VAT, as opposed to being zero-rated, the tax paid on purchased inputs could not then be offset against liability for tax on outputs, or be refunded). We expect that the VAT, with a combination of exemptions and enhanced excises could approximate existing effective taxes (much of the high taxation of cigarettes is, however, on account of high nominal rates of tax, the tax element through inputs being rather less important).

For Reform I, replacing the revenues from all other taxes, apart from the predetermined excises, yields a single rate VAT of 14%. For Reform II, we introduce an additional excise of 5% on "meat", which is, from the analysis of reform and from the point of view of distributional characteristics, an attractive candidate for additional taxation at higher levels of inequality aversion. This would permit a reduction in the VAT of half a percentage point. A similar excise tax on "milk" would permit another half a percentage point in the VAT rate (Reform III).

The second set of assumptions sets a two-rate VAT for each of the three reforms, with the lower rate of around 10% for a set of commodities with high ranking distributional characteristics: "edible oils", "sugar" (see the discussion in Bird, 1987, concerning the taxation of sugar, which had traditionally been considered a good candidate for additional taxation), "hygiene and medicines", and "housing, fuel and light". This increases the VAT rate on the remaining commodities by roughly 2% points for the three reforms (see Reforms Ia, IIa and IIIa).

It appears that even Reform I, with the single rate-VAT, would dominate the existing set of effective taxes on distributional grounds, with over 60% of households being made better off. The reduction in VAT rates, combined with a tax on "meat" (Reform II), appears to make more households better off, although the additional tax on "milk" combined with a further reduction in VAT appears to make fewer people better off in comparison with the other two reforms. However, there is a differential impact on various deciles of the size distribution. From Table 3b we observe that the middle expenditure groups (4 to 15 half deciles) gain most from Reform I, and only for the top 10% do more than 50% of households lose. Reforms II and III are more egalitarian, in that a greater proportion of the poorest household groups gain than correspondingly richer ones. Thus Reform III, in which only 54% of households gain, relative to around 61% for both Reforms I and II, might be preferred by a distribution conscious policy maker in that a greater proportion of the bottom 20%, or the hard-core poor are made better off.

There are important sectoral differences. While more rural households in aggregate are made better-off than the urban, more of the

poorer urban households gain, particularly for Reforms I and II. We have also conducted the exercise at the Provincial level, although these results are not presented here. It would appear that sectoral differences are rather more significant than the regional patterns which roughly reflect the patterns of gainers and losers at the national level.

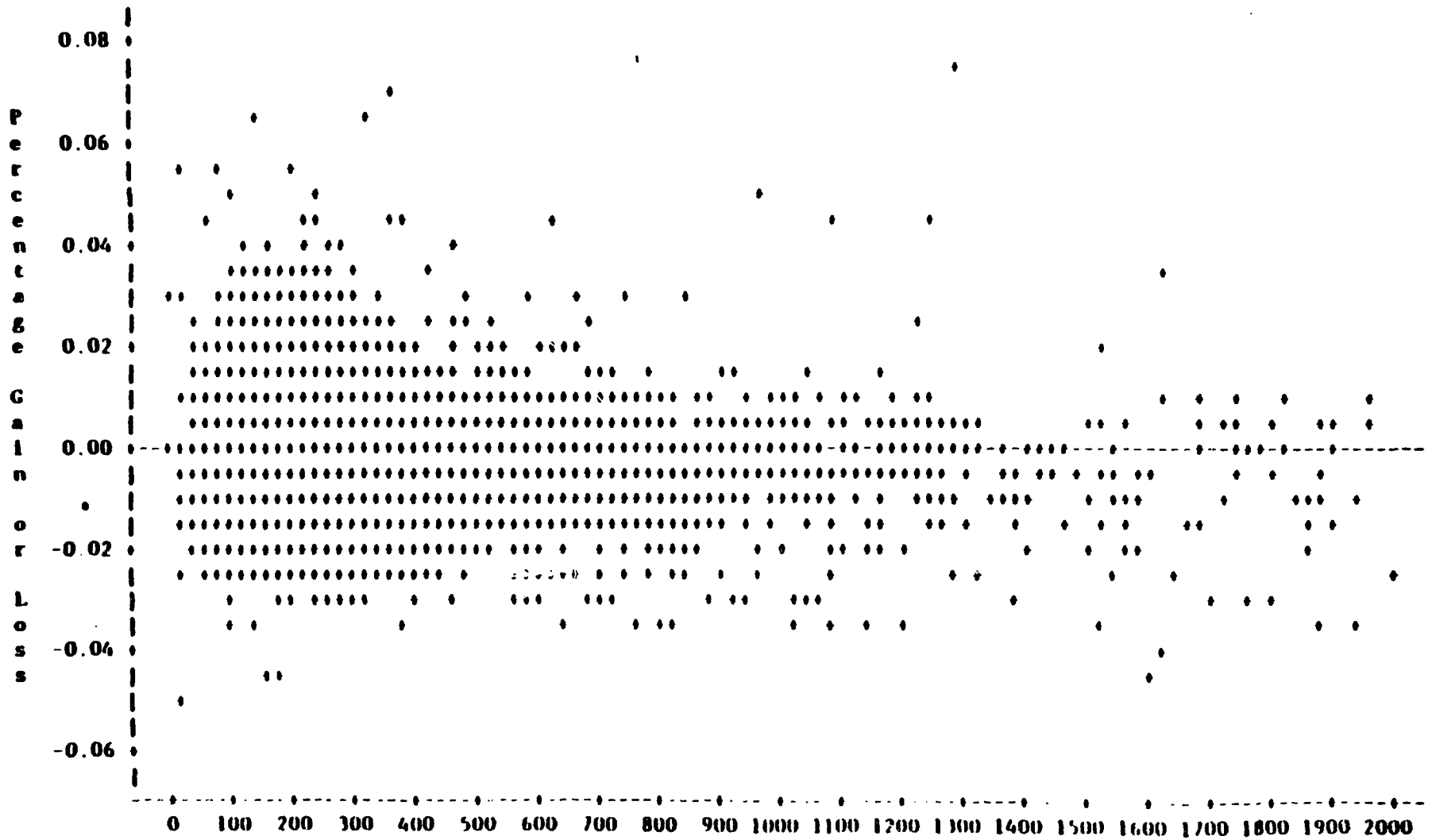
The two-tier VAT makes little difference in rural areas, given the consumption patterns, and particularly consumption out of home-grown stocks. However, the effect of the two-tier VAT is that it sharply increases the number of poor urban gainers and reduces the number of gainers among the top 5%.

The extent to which the poor or rich lose or gain, given that there are gainers and losers in each expenditure category, may be seen from the illustrative diagram of the proportionate gains and losses for Reforms I and IIIa. Since there are a large number of hidden observations, the diagrams have to be interpreted in the context of the Text tables and calculations of the average gain/loss per household group. We observe that, on average, for the equal revenue reforms described above, it is the top 10% to 20% that lose, although there are individual households that gain and lose in each half decile. While there are losses even among the poorest household groups, these are more than compensated by gains within each half decile and, on average, there is a net gain for the poorer household groups in all reforms. This is most marked with the two-tier VAT, Reform IIIa being the most attractive in this respect.

In practice, agricultural commodities would be exempt rather than zero-rated. In some cases effective subsidies on inputs might well cancel

Diagram 1

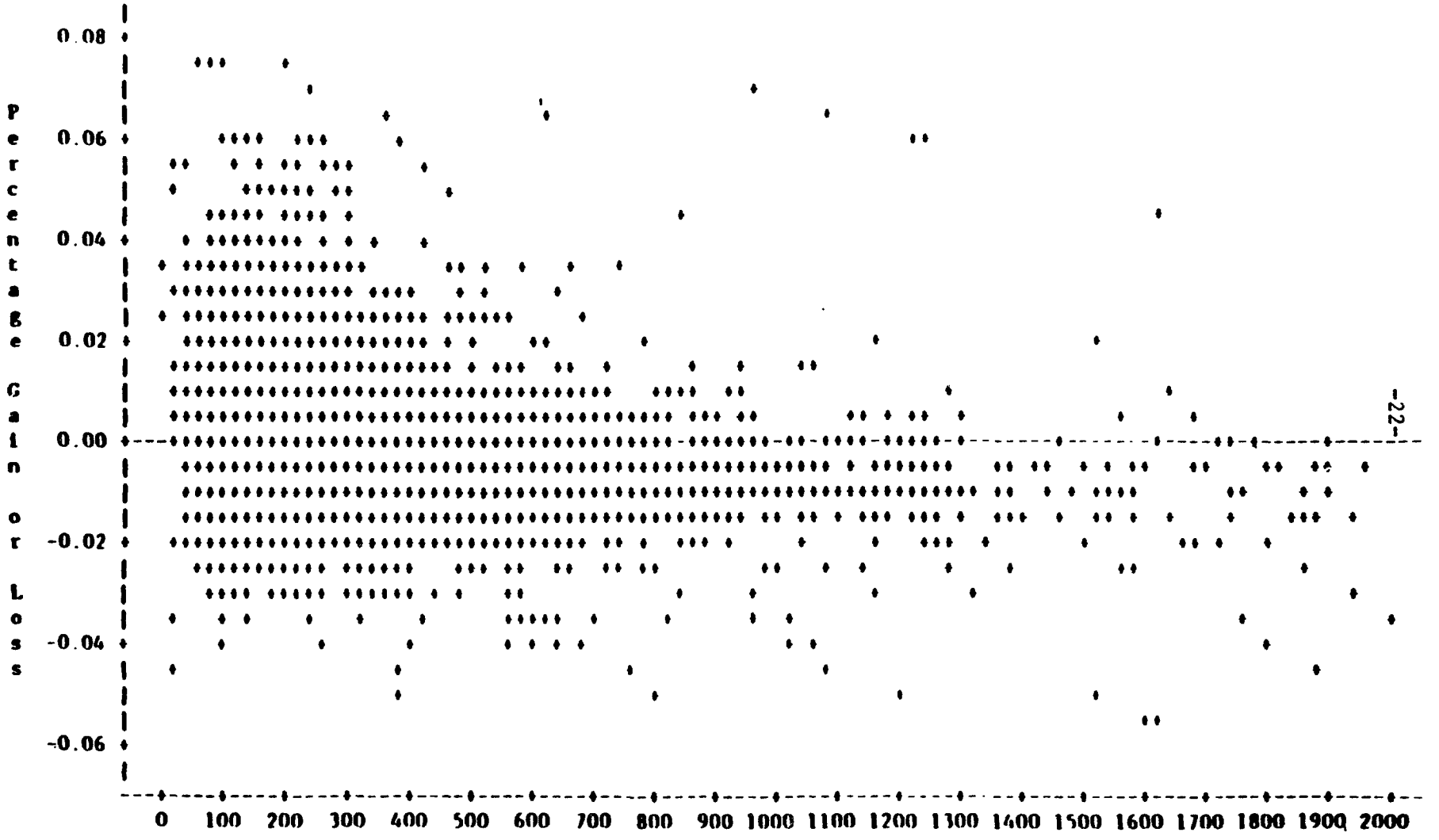
Pakistan: Gainers/Losers from Reform I



TF 37 or of 15846 observations hidden.

Diagram 2

Pakistan: Gainers/Losers from Reform IIIa



NOTE: 42 observations had missing values or were out of range. 15797 observations hidden

out the effects of taxes on inputs, and the agricultural sector could effectively be zero-rated, for the most part, with a possibility of the wheat subsidy being maintained in some form. In this paper, we have assumed no change in the price of wheat. Similarly, the effective tax on "gur" is assumed unchanged (given that the commodity is only taxed through the input structure) for most of the reform simulations. Further a movement from a positive effective tax on "pulses" and "maize" to effective zero-rating for the reasons mentioned above, may not be plausible in all circumstances. However, recomputations of gainers and losers, keeping the positive effective tax on maize and pulses as the likely consequence of exempting this sector, rather than zero-rating it, does not greatly change the overall results, though there are fewer gainers on average, down to 59% for Reform 1, as against almost 61% reported in Table 3a. The differences are even less marked for other reforms (details available on request).

The practical problems in administering anything other than exemption for agriculture by the VAT authorities would be enormous. It seems, however, that the administrative constraints here are not overly inconsistent with directions of reform which might be chosen in ignorance of the constraints and this conforms broadly with directions of reform that have been identified elsewhere (see Ahmad and Stern, 1986). The profits of the cotton and rice-trading corporations on exports might be additional revenue sources that the government might wish to retain, and which would not affect the picture drawn above.

3.2 The VAT with additional revenue

Various additional revenue possibilities are described in Table 4a. In order to mitigate the effects of increased revenue requirements, we have opted for combinations of two-tier VAT structures, supplemented by the usual combination of excises, including the evaluation of additional taxation of "milk" and "meat products" in Reforms V, VI, VII and IX.

Reform IV is a likely candidate for adoption, with the lower rate of 10% for "edible oils", "tea", "housing, fuel and light", and "clothing", combined with a standard rate of 20%. If consumption patterns remain constant, this would lead to 6.6% additional revenue, and 50% of households could still be made better off.

Reform V maintains the lower rate 10% VAT only on edible oils, with a 15% flat rate for all other commodities, combined with an increased excise on "bidis" (10%), and the 5% excises on "meat" and "milk products". While this could raise 10% in additional revenue from indirect taxes, only 17% of households benefit. However, the poor would be less affected than the relatively well off, and the average loss for the poorest 20% of the population would be less than half of one percent of their expenditures, as against 1.6% for the top 5%. Reform VI is much the same as V, except that there is now a flat rate of 15% on all goods. An additional 5% excise is now levied on "confectionary" and "beverages", which were desirable candidates for additional taxation (see the λ^{ν} in Table 2 and the distributional characteristics in Table 1). This reform could raise 12% in additional revenue, and yet around 10% of the population would be made better off: largely concentrated in rural areas and amongst the poorest in

the urban areas. The average loss per income half decile is still 'progressive': the richest 5% lose around 2% of their incomes, and the poorest around 0.7 of one percent on average.

The treatment of the "housing, fuel and light" consumption category is problematic in terms of tax classifications. Fuel and light for the poorest groups consist principally of wood and kerosene; which are relatively lightly taxed; and for the richer groups these include inter alia gas, petroleum and electricity. Thus, whilst we might wish to increase the tax on the items consumed relatively more by the rich, it might be neither feasible nor desirable to increase the tax on firewood, dung-cakes or (to some extent) kerosene. While, in previous reforms we had allowed the tax on this sector to vary with the VAT, in Reforms VII, VIII and X we set this to reflect a set of excises that would yield an average of 5% (as against a base case of 10%, with the effective tax calculations). While revenue increases only slightly for Reform VII over Reform VI, with a 20% VAT compensating for the reduced revenue from "housing, fuel and light", the proportion of households gaining goes up to 23%. Again these are concentrated relatively amongst the poorer sections of the population.

A comparison of Reform VIII relative to Reform VII illustrates the effects of taxing "milk". While this tax could potentially add 3% in revenue, 10% of households who could have actually gained from Reform VIII would be made worse off with the tax on "milk". This is an example of varying the tax on one commodity, while holding others constant (subject, of course, to the limitations of the assumption of unchanged consumptions). The maximum revenue case we consider is that of a 20% VAT, with excises on "housing, fuel and light", and "bidis" held constant, but with the

Table 4a Effective Taxes and Additional Revenue Reforms

Commodity	Effective Tax	Reforms						
		IV	V	VI	VII	VIII	IX	X
	%	%	%	%	%	%	%	%
(1) Wheat	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(2) Rice	2.3	2.3	2.3	2.3	2.3	2.3	0.0	0.0
(3) Pulses	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(4) Maize	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(5) Meat	0.5	0.0	5.0	5.0	5.0	5.0	5.0	5.0
(6) Milk	0.5	0.0	5.0	5.0	5.0	0.0	5.0	0.0
(7) Vegetables/Fruit/Spices	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(8) Edoils	13.9	10.0	10.0	15.0	5.0	5.0	5.0	15.0
(9) Sugar	28.7	20.0	15.0	15.0	20.0	20.0	20.0	20.0
(10) Gur	1.6	1.6	1.6	1.6	1.6	1.6	0.0	1.6
(11) Confectionary	18.5	20.0	15.0	20.0	20.0	20.0	20.0	20.0
(12) Tea	11.0	10.0	15.0	15.0	5.0	5.0	10.0	5.0
(13) Beverages	17.0	20.0	15.0	20.0	20.0	20.0	20.0	20.0
(14) Cigarettes	77.0	77.0	77.0	77.0	77.0	77.0	77.0	77.0
(15) Bidis	6.0	6.0	10.0	6.0	6.0	6.0	6.0	15.0
(16) Housing/Fuel/Light	10.0	10.0	15.0	15.0	5.0	5.0	10.0	5.0
(17) Clothing	9.0	10.0	15.0	15.0	20.0	20.0	20.0	20.0
(18) Hygiene/Medicine	25.0	20.0	15.0	15.0	20.0	20.0	20.0	20.0
(19) Recreation/Transport	9.0	20.0	15.0	15.0	20.0	20.0	20.0	20.0
(20) Other Food	3.0	3.0	5.0	5.0	5.0	5.0	5.0	5.0
(21) Other Non-Food	15.0	20.0	15.0	15.0	20.0	20.0	20.0	20.0
Gainers - Pakistan		50.67	17.16	9.48	23.33	34.1	7.3	16.3
Additional Revenue -		6.6	9.8	12.2	13.1	10.2	19.8	14.5

Note Reforms IV-X reflect a set of proposed tax rates that would replace the existing "effective tax vector". The gainers represent the proportion of households benefitting from the reform. The estimates of additional revenue are based on the assumption of unchanged consumptions, and are therefore only representative of first round effects.

Table 4b Distribution of Gainers for Additional Revenue Reforms

Per Capita Expenditure Groups	Mean Rs/ Capita Per month	No. of House-holds	Percentage of Gainers in each Group Reforms IV	V	VI	VII	VIII	IX	X
1	98.7	828	64.49	29.35	16.67	29.35	33.70	14.61	12.92
2	126.5	829	66.10	28.35	14.48	30.16	36.31	13.63	15.20
3	143.4	829	66.95	22.68	13.63	28.11	36.79	11.58	14.23
4	155.9	829	60.43	27.02	14.11	29.19	40.05	12.30	15.92
5	168.1	828	64.49	23.55	11.59	26.81	40.46	8.70	14.86
6	181.4	829	63.21	22.32	12.91	29.19	43.18	10.62	19.30
7	193.7	829	61.88	20.39	11.82	28.11	40.29	9.41	19.42
8	205.7	829	62.00	19.54	10.62	26.66	40.17	6.51	18.34
9	221.0	828	58.70	19.08	9.54	27.66	40.70	8.21	18.36
10	232.0	829	58.75	16.53	8.08	25.57	39.20	7.24	18.82
11	249.8	829	54.40	15.08	7.72	24.73	37.15	6.63	18.70
12	264.3	829	52.11	16.41	8.93	25.09	38.60	6.88	19.30
13	283.0	828	51.81	16.43	9.66	21.98	36.23	6.88	19.20
14	309.3	829	47.17	12.79	7.72	20.51	33.78	4.83	16.16
15	335.0	829	45.60	12.79	7.96	20.63	33.41	4.95	17.49
16	368.5	829	40.41	10.01	5.67	18.82	30.04	4.34	17.01
17	416.8	828	38.04	11.11	5.43	17.39	29.11	3.62	14.49
18	490.9	829	28.83	8.81	5.31	15.32	23.64	2.05	14.84
19	624.6	829	19.42	6.76	4.34	12.18	17.37	0.97	12.42
20	1158.2	829	8.69	4.34	3.50	9.17	11.82	1.69	9.53
Total		16575	50.67	17.16	9.48	23.33	34.10	7.28	16.33
Pakistan Urban		7459	48.77	9.29	4.21	23.65	38.79	5.42	21.38
Pakistan Rural		9116	52.23	23.61	13.80	23.07	30.27	8.81	12.19

Note: Groups are sorted by per-capita expenditure, so group 1 is the per-capita expenditure of the poorest 5% while group 20 is the per-capita expenditure of the richest 5%.
See Table 4a for a description of the Reforms.

effective tax on "edible oils" reduced to a 5% excise, in line with that proposed for "milk" and "meat". This could raise 20% in additional revenue, but most people would be affected, albeit the rich more than the poor.

The estimates of additional revenue range from 6% (Reform IV) to just under 20% (Reform IX) over the existing effective tax vector. The effective taxes represent the tax element in the price of domestically produced goods and services, including the effects of the taxation of imported materials used in the production of such goods. Thus taking the existing set of domestic indirect taxes only (6% of GDP in recent years) would underestimate the base of the effective tax calculations. Note that total indirect taxes include duties on imported goods mainly on inputs, in addition to a proportion on final goods, as well as taxes on domestic inputs and final goods. Since total indirect taxes have been around 11.5% of GDP, a rough calculation would suggest that 20% additional indirect tax revenue could yield upto 2% of GDP. Rate changes are part of the story, and in practice much will depend on what decisions are taken to determine the base and coverage of the new tax: whether it is upto the retail stage, or is restricted to the wholesale or manufacturers' and importers' stages.

3.3 Major Price Changes

While the analysis of Sections 3.1 and 3.2 had the advantage of being based on actual consumptions and demand patterns, the assumption of unchanged consumption in the face of clearly non-marginal price changes, particularly in the revenue raising case, is less than satisfactory. Here we examine the story of the earlier sections with the use of fitted demands

Table 5a: Pakistan Equivalent Variations

(Changes in Per Capita Consumption Rs/month)

Half Deciles	Reforms												
	I	Ia	II	IIa	III	IIIa	IV	V	VI	VII	VIII	IX	X
IG1	-1.458	.231	-1.207	.429	-1.291	.350	.777	-2.139	-2.394	2.098	2.435	-.076	1.904
IG2	-1.445	.381	-1.207	.557	-1.386	.397	.787	-2.499	-2.810	1.956	2.453	-.520	1.845
IG3	-1.437	.472	-1.207	.634	-1.443	.425	.792	-2.717	-3.062	1.871	2.464	-.788	1.809
IG4	-1.431	.540	-1.208	.692	-1.486	.446	.797	-2.879	-3.250	1.807	2.472	-.988	1.783
IG5	-1.714	.848	-1.608	.874	-2.065	.432	1.563	-3.425	-3.834	2.492	3.330	-.695	2.553
IG6	-1.739	.868	-1.626	.895	-2.090	.456	1.482	-3.593	-4.037	2.410	3.288	-.925	2.472
IG7	-1.761	.887	-1.643	.915	-2.112	.477	1.409	-3.747	-4.224	2.334	3.250	-1.137	2.398
IG8	-1.783	.905	-1.660	.934	-2.135	.499	1.336	-3.898	-4.407	2.259	3.212	-1.344	2.326
IG9	-1.510	1.725	-1.688	1.453	-2.553	.596	2.622	-4.061	-4.768	2.574	3.892	-1.030	2.777
IG10	-1.542	1.739	-1.692	1.491	-2.571	.628	2.513	-4.222	-4.967	2.528	3.895	-1.247	2.731
IG11	-1.587	1.759	-1.697	1.544	-2.596	.674	2.360	-4.449	-5.249	2.464	3.900	-1.554	2.668
IG12	-1.626	1.776	-1.702	1.590	-2.618	.713	2.228	-4.644	-5.491	2.408	3.904	-1.817	2.613
IG13	-2.767	1.044	-2.848	.826	-3.559	.161	1.749	-6.040	-6.761	2.684	4.060	-2.447	2.995
IG14	-2.894	.974	-2.992	.731	-3.747	.040	1.482	-6.542	-7.340	2.400	3.893	-3.081	2.764
IG15	-3.018	.906	-3.133	.638	-3.930	-.077	1.221	-7.030	-7.902	2.122	3.730	-3.697	2.539
IG16	-3.180	.818	-3.316	.517	-4.169	-.230	.881	-7.667	-8.636	1.761	3.517	-4.501	2.246
IG17	-5.309	1.177	-5.621	.653	-6.427	-.081	2.658	-10.414	-11.501	5.100	6.885	-3.687	5.595
IG18	-6.511	-.288	-6.669	-.682	-7.312	-1.178	.179	-12.431	-13.612	2.990	4.858	-6.756	3.524
IG19	-8.683	-2.935	-8.561	-3.094	-8.911	-3.162	-4.301	-16.074	-17.427	-.822	1.195	-12.300	-.217
IG20	-17.347	-13.493	-16.111	-12.716	-15.292	-11.073	-22.174	-30.609	-32.643	-16.028	-13.414	-34.418	-15.143

Note: The equivalent variations are estimated using piece-wise linear ELES estimates for rural and urban households (see equation 11 and text).

Table 5b: Pakistan Equivalent Variations

(Changes in Proportions of Per Capita Consumption)

Half Deciles	Reforms												
	I	Ia	II	IIa	III	IIIa	IV	V	VI	VII	VIII	IX	X
IG1	-.015	.002	-.012	.004	-.013	.004	.008	-.022	-.024	.021	.025	-.001	.019
IG2	-.011	.003	-.010	.004	-.011	.003	.006	-.020	-.022	.015	.019	-.004	.015
IG3	-.010	.003	-.008	.004	-.010	.003	.006	-.019	-.021	.013	.017	-.005	.013
IG4	-.009	.003	-.008	.004	-.010	.003	.005	-.018	-.021	.012	.016	-.006	.011
IG5	-.010	.005	-.010	.005	-.012	.003	.009	-.020	-.023	.015	.020	-.004	.015
IG6	-.010	.005	-.009	.005	-.012	.003	.008	-.020	-.022	.013	.018	-.005	.014
IG7	-.009	.005	-.008	.005	-.011	.002	.007	-.019	-.022	.012	.017	-.006	.012
IG8	-.009	.004	-.008	.005	-.010	.002	.006	-.019	-.021	.011	.016	-.007	.011
IG9	-.007	.008	-.008	.007	-.012	.003	.012	-.018	-.022	.012	.018	-.005	.013
IG10	-.007	.007	-.007	.006	-.011	.003	.011	-.018	-.021	.011	.017	-.005	.012
IG11	-.006	.007	-.007	.006	-.010	.003	.009	-.018	-.021	.010	.016	-.006	.011
IG12	-.006	.007	-.006	.006	-.010	.003	.008	-.018	-.021	.009	.015	-.007	.010
IG13	-.010	.004	-.010	.003	-.013	.001	.006	-.021	-.024	.009	.014	-.009	.011
IG14	-.009	.003	-.010	.002	-.012	.000	.005	-.021	-.024	.008	.013	-.010	.009
IG15	-.009	.003	-.009	.002	-.012	.000	.004	-.021	-.024	.006	.011	-.011	.008
IG16	-.009	.002	-.009	.001	-.011	-.001	.002	-.021	-.023	.005	.010	-.012	.006
IG17	-.013	.003	-.013	.002	-.015	.000	.006	-.025	-.028	.012	.017	-.009	.013
IG18	-.013	-.001	-.014	-.001	-.015	-.002	.000	-.025	-.028	.006	.010	-.014	.007
IG19	-.014	-.005	-.014	-.005	-.014	-.005	-.007	-.026	-.028	-.001	.002	-.020	.000
IG20	-.015	-.012	-.014	-.011	-.013	-.010	-.019	-.026	-.028	-.014	-.012	-.030	-.013

See Note to Table 5a.

and the estimation of equivalent variations for all the reforms considered above. The results are presented in Tables 5 a and b for Pakistan.

It is apparent that the equivalent variations, for the "revenue neutral" though more differentiated tax changes (Reforms Ia, IIa and IIIa) give similar results to the first-order approximations of gainers and losers: with Reform IIIa being the most progressive, and the others with the middle expenditure groups gaining more than the poorest, but with the richest being made worse off. However, with the proportional VAT (Reforms I, II and III), all groups are made worse-off on average. The middle income groups are le.s affected in terms of their income levels than the poorest or the richest for Reforms I and II, and all groups are proportionally hit by Reform III. Clearly, in such cases the reforms are not revenue neutral. The reason for the apparent confirmation in the two-tier case lies in that the changes in prices are small relative to those involved in the proportional VAT cases.

The equivalent variations are estimated on the basis of step-wise ELES parameters evaluated for five sets of per-capita expenditure groups at the group means, for urban and rural areas respectively. The use of these parameters generates average gains and losses for each expenditure group. This is similar to the average gain or loss estimated for each group in the first approximations described in previous sections. While it is possible, in principle, to generate a distribution of such gains and losses by household, the usefulness of such an exercise is limited by the fact that the demand parameters are group-specific rather than household specific. For the purposes of exposition, therefore, we concentrate on the average gain/loss per expenditure group, in assessing the effects of non-marginal tax changes.

One of the most interesting cases yielding additional revenue in the first order approximations is that of Reform IV. The first order approximations suggested that 50% of households would be made better off with this tax change. The equivalent variations also confirm that this is likely to be a progressive reform. A substantial element in the gains made at the lower deciles of the size distribution relate to the relatively favourable treatment of "edible oils", "tea" and "housing fuel and light", all commodities which have high ranking distributional characteristics (we have noted the problem with the treatment of the housing fuel and light sector). Consequently, gains are displayed in all reforms in which the taxation of such goods is restricted, and illustrated in addition by Reforms VII, VIII and X. Given that additional taxation is not imposed on "housing fuel and light" in Reform X, and the excises on "edible oils" are reduced, the equivalent variations for this reform suggest a relatively progressive sharing of the burden of the additional revenues, one that would be preferable to that imposed by the equal revenue Reform I.

4. Concluding Remarks

We have seen the value of the analysis of reform in guiding the choice of a desirable structure of indirect taxation. For policy makers we have illustrated how the evaluation of directions of reform might proceed, without overly complicated models of the economy, and with the sort of data that is now increasingly available (e.g. the programme of household surveys being conducted by various divisions of the World Bank, and by other international agencies, in addition to national surveys conducted by many Statistical Offices around the world).

Countries such as Pakistan relying on a narrow tax base, consisting primarily of tariffs on a limited range of goods and specific excises on domestic manufacturing, have difficulty in ensuring that the tax system keeps pace with the growth in national income and activity without frequent discretionary changes. Such changes increase the distortions caused by cascading with adverse effects on exports, as well as undesirable consequences for poor households. A correctly designed consumption-based tax instrument such as the VAT has the potential to increase the tax base, remove production distortions, and is potentially attractive in terms of distributional consequences. While country-specific administrative capabilities need to be addressed in the design of alternate tax systems, it is likely that the VAT would in general be preferable to a system of ad valorem retail sales taxation. The latter would also avoid cascading, but may have a more uncertain revenue yield than the VAT, which is collected at each stage in the production process and not just at the retail level. Indeed some of the options for a VAT for developing countries suggest the adoption, in the first instance, of a VAT at the import and manufacturing stages, extending to the wholesale level. Further advantages of a VAT include a better flow of information that helps in the collection of income and corporation taxes (see Gil Diaz, 1987), and fewer distortions in production decision making.

If it is considered important to protect the poor, in addition to raising revenues, then it has been demonstrated that there are policy tools and especially tax instruments which could be designed to meet this objective.

References

Ahmad, S.E. and S. Ludlow, (1987), "Aggregate and regional demand response patterns in Pakistan", Pakistan Development Review, Papers and Proceedings, Winter.

Ahmad, S.E. and N.H. Stern, (1984), "The theory of reform and Indian indirect taxes", Journal of Public Economics, December.

Ahmad, S.E. and N.H. Stern, (1986), "Tax-reform in Pakistan (I): overview and effective taxes for 1975-76", Pakistan Development Review, Spring.

Ahmad, S.E. and N.H. Stern, (1987), "Alternative sources of government revenue", Chapter 11 in D.M.G. Newbery and N.H.Stern, (eds.), (1987).

Ahmad, S.E. and N.H. Stern, (1987a), Fiscal Policy for the Seventh Five Year Plan, Government of Pakistan, processed.

Ahmad, S.E and N.H. Stern, (1988), "Tax Reform and Shadow Prices for Pakistan", LSE Development Economics Research Programme, Discussion Paper 10 (forthcoming in a Special Issue on Public Economics of the Oxford Economic Papers).

Ahmad, S.E., D.Coady and N.H. Stern, (1988), "A complete set of shadow-prices for Pakistan", Pakistan Development Review, Spring.

Bird, R., (1987), "A new look at indirect taxes in developing countries", World Development, 15, No.9.

Deaton, A.S., (1981), "Optimal taxes and the structure of preferences", Econometrica, 84, No.334.

Deaton, A.S., (1987), "Econometric issues for tax design in developing countries", in D.M.G. Newbery and N.H. Stern (eds), (1987).

Deaton, A.S. and N.H. Stern, (1987)," Optimally uniform commodity taxes, taste differences and lump-sum grants", Economics Letters, 20, No.3.

Dreze, J.P. and N.H. Stern, (1987), "The theory of cost-benefit analysis" in A. Auerbach and M. Feldstein (eds), Handbook of Public Economics, North Holland.

Gil Diaz, F., (1987), "Some lessons from Mexico's tax reform', Chapter 12 in D.M.G. Newbery and N.H. Stern, (eds.), (1987).

National Taxation Reforms Commission, Pakistan, Final Report, (1987), Karachi.

Newbery, D.M.G. and N.H. Stern, eds.,(1987), The Theory of Taxation for Developing Countries, The World Bank/Oxford University Press.

Stone, R., (1970), Mathematical Models of the Economy and other Essays, Chapman and Hall.

Tanzi, V., (1987), "Quantitative characteristics of the tax system of developing countries", Chapter 8 in D.M.G. Newbery and N.H.Stern, (eds.), (1987)

PPR Working Paper Series

	Title	Author	Date	Contact for paper
WPS215	Adjustment and Income Distribution: A Counterfactual Analysis	Francois Bourguignon William H. Branson Jaime de Melo	May 1989	M. Ameal 61466
WPS216	Price and Quality Effects of Vers--Revisited: A Case Study of Korean Footwear Exports	Jaime de Melo L. Alan Winters	June 1989	M. Ameal 61466
WPS217	Public Debt, North and South	Helmut Reisen		
WPS218	Public Finance, Trade and Development: The Chilean Experience	Vittorio Corbo	July 1989	A. Oropesa 61758
WPS219	Rural Credit in Developing Countries	Avishay Braverman J. Luis Guasch	June 1989	C. Spooner 37570
WPS220	Capacity Building for Policy Analysis	Samuel Paul David Steedman Francis X. Sutton	July 1989	E. Madrona 61712
WPS221	How Does Uncertainty About the Real Exchange Rate Affect Exports?	Ricardo J. Caballero Vittorio Corbo	June 1989	A. Oropesa 61758
WPS222	Why Stabilisation Policies in Zambia Did Not Succeed	Christopher Colclough		
WPS223	Overvalued and Undervalued Exchange Rates in An Equilibrium Optimizing Model	Jose Saul Lizondo		
WPS224	The Economics of the Government Budget Constraint	Stanley Fischer	May 1989	S. Fischer 33774
WPS225	Targeting Assistance to the Poor: Using Household Survey Data	Paul Glewwe Oussama Kanaan	June 1989	B. Rosa 33751
WPS226	Inflation and the Costs of Stabilization: Historical Cases, Recent Experiences and Policy Lessons	Andres Solimano		
WPS227	Institutional Reforms in Sector Adjustment Operations	Samuel Paul		

PPR Working Paper Series

	Title	Author	Date	Contact for paper
WPS228	Economic Performance of Developing Countries in the 1980s	Robert Lynn F. Desmond McCarthy		
WPS229	The Effect of Demographic Changes on Saving for Life-Cycle Motives in Developing Countries	Steven B. Webb Heidi Zia	July 1989	E. Khine 61765
WPS230	Unemployment, Migration and Wages in Turkey, 1962-1985	Bent Hansen	July 1989	C. Bermudez 39248
WPS231	The World Bank Revised Minimum Standard Model	Doug Addison	May 1989	J. Onwuemene-Kocha 61750
WPS232	Women and Food Security in Kenya	Nadine R. Horenstein	June 1989	M. Villar 33752
WPS233	Public Enterprise Reform in Adjustment Lending	John Nellis	August 1989	R. Malcolm 61708
WPS234	A Consistency Framework Macroeconomic Analysis	William Easterly	June 1989	R. Luz 61760
WPS235	Borrowing, Resource Transfers and External Shocks to Developing Countries: Historical and Counterfactual	Steven Webb Heidi Zia	July 1989	E. Khine 61765
WPS236	Education and Earnings in Peru's Informal Nonfarm Family Enterprises	Peter Moock Philip Musgrove Morton Stelcner	July 1989	M. Fisher 34819
WPS237	The Curricular Content of Primary Education in Developing Countries	Aaron Benavot David Kamens	June 1989	C. Cristobal 33640
WPS238	The Distributional Consequences of a Tax Reform on a VAT for Pakistan	Ehtisham Ahmad Stephen Ludlow	August 1989	A. Bhalla 60359
WPS239	The Choice Between Unilateral and Multi-lateral Trade Liberalization Strategies	Julio Nogues	July 1989	S. Torrijos 33709